IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Roland Treutlein, et al.

Serial No.: Unassigned

Filed: Herewith

PCT No.: PCT/DE 01/02011

For: FILM COMPOSITE, METHOD FOR PRODUCING THE SAME AND ITS USE

Attorney Docket No.: WET 0106 PUS

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January 23, 2002 **Angie Moscowitz** _____
Date of Deposit **Signature**

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the application as follows:

In The Drawings:

Please substitute the two (2) sheets of drawings submitted herewith, one sheet containing Figures 1, 2A and 2B and the second sheet containing Figure 3, in place of the PCT application drawing sheets containing the same figures.

In The Specification:

On page 1 of the English language translation of the German PCT Application, please amend the first heading of the specification to appear as follows:

Background Of The Invention

On page 4 of the English language translation of the German PCT Application, please insert the following heading between the second and third paragraphs of the specification and amend the third paragraph to appear as follows:

Consequently, the object of the invention is to prepare a halogen-free composite film and a process for manufacturing the same, wherein the composite film must satisfy the above-mentioned requirements.

Summary Of The Invention

This object is achieved in that the halogen-free composite film in accordance with the invention includes at least one to N sealable, multi-layered laminated films, wherein N is an integer from 2 to 10. A functional layer and/or a functional element is interposed between the individual laminated films. The individual sealable, multi-layered laminated films are composed of a first and a second film that are bonded together by means of a laminating adhesive or lacquer. The films in the individual laminated films can be identical to and/or different from one another.

On page 6 of the English language translation of the German PCT Application, please amend the first full paragraph to appear as follows:

The following can be used as thermally activated substances, depending on the later use of the composite film: copolyester systems, cyclo-olefin copolymers, polyurethanes, acrylates and derivatives thereof, vinyl acetate copolymers, polyvinyl alcohols, polyvinyl butyrals, polyvinyl acetates, sealable maleic resins, alkyd resins, polyolefins and polyamides. In addition, saturated,

unsaturated, linear and/or branched copolyesters can also be used, such as products from the DYNAPOL line from Degussa. These materials are distinguished by the fact that they are durable yet at the same time are intrinsically flexible, bond well to metals, and have good resistance to chemicals.

On page 7 of the English language translation of the German PCT Application, please insert the following heading between the fifth and sixth paragraphs of the specification, amend the sixth paragraph and add a new seventh and eighth paragraphs to appear as follows:

Moreover, the composite film can be used as a protective film and/or cover film for flexible printed conductors.

Brief Description Of The Drawings

Figure 1 shows the structure of a ribbon cable manufactured in accordance with one embodiment of the composite film.

Figures 2A and 2B show a laminated film according to the present invention with shielding on the inside and a laminated film with shielding on the outside.

Figure 3 is a schematic diagram of a lacquering and laminating system for producing a composite film in accordance with the present invention.

On page 7 of the English language translation of the German PCT Application, please insert the following heading between the sixth and seventh paragraphs of the

specification and amend the seventh paragraph which continues on page 8 to appear as follows:

Figure 1 shows the structure of a ribbon cable that was manufactured with the composite film.

Detailed Description Of The Invention

Referring now to Figure 1, for the manufacture of ribbon cables, two identical or different laminated films A and B are used, which consist of a film 1, a laminating lacquer 2, a film 3 and if applicable a thermally activated substance 4. For the functional layer, a metallic conductor, for example stranded copper wire, is laminated between two strips of the laminated films A and B. The process is performed in such a way that a copper foil is cut into narrow strips on the laminating machine and laminated between the two laminated film strips by hot laminating rollers at temperatures ranging from 150° C to 400° C, preferably 180° C to 280° C. At the laminating station, the two strips of film with the metallic conductor in the intermediate layer are sealed together through pressure and temperature. As a result of this pressure and temperature treatment, the thermally activated substance or sealing film becomes thermoplastic and bonds to the second strip of film.

On page 12 of the English language translation of the German PCT Application, please amend the second full paragraph which continues on page 13 to appear as follows:

Figure 3 shows a schematic representation of the lacquering and laminating system for producing the

laminated film. The film to be laminated is located on roller 10, and this film is transported to the applicator unit 20, where the laminating adhesive is applied by means of appropriate application technologies, such as smooth roller application, gridded roller application, or brushed application. After application of the laminating adhesive, the coated film is transported to the drying tunnel 30. Located at the end of the drying tunnel is a supply roll device with another film 40; the two films are bonded together in the laminating station 50. Next, this laminated film is reeled by an appropriate device 60 and the adhesive is cured. When needed, the incoming film is coated with a thermally activated substance.

In The Claims:

Please cancel claims 1-24.

Please add new claims 25-45 to read as follows:

25. (New) A halogen-free composite film comprising at least one to N sealable, multi-layered laminated film(s), wherein N is an integer from 2 to 10, and in which a functional element is interposed between the individual laminated films.

26. (New) A composite film according to claim 25 wherein the functional element is a printed circuit board, a sensor, a metallic stranded wire, a metallic conductor material, or an electronic component.

27. (New) A composite film according to claim 25 wherein the sealable, multi-layered laminated films each comprise a first film, a laminating adhesive or lacquer, and a second film.

28. (New) A composite film according to claim 25 wherein each of the sealable, multi-layered laminated films are identical to one another.

29. (New) A composite film according to claim 27 wherein the second film of each laminated film comprises a thermally activated substance.

30. (New) A composite film according to claim 27 wherein the first and the second film of the individual laminated films are selected from the group consisting of: liquid crystal polymer, polyphenylene sulfide, polyethylene terephthalate, polyethylene naphthalate, polyketone, polyetherketone, polyetheretherketone, polyetherketone-ketone, polyetheretherketoneketone, polyetherimide, polyether sul-fone, polysulfone, cyclo-olefin copolymer, and polyamide films.

31. (New) A composite film according to claim 27 wherein the laminating adhesive or lacquer is selected from the group consisting of: acrylates, polyurethanes, polyester polyols, polyester urethanes, epoxides, copolyesters or

natural adhesive resins, which can be used as single-component or multi-component systems.

32. (New) A composite film according to claim 30 wherein the laminating adhesive or lacquer is selected from the group consisting of: acrylates, polyurethanes, polyester polyols, polyester urethanes, epoxides, copolyesters or natural adhesive resins, which can be used as single-component or multi-component systems.

33. (New) A composite film according to claim 27 wherein the wet application weight of the laminating adhesive is 2 g/m^2 to 40 g/m^2.

34. (New) A composite film according to claim 29 wherein the thermally activated substance is selected from the group consisting of: cyclo-olefin copolymers, polyesters, polyurethanes, acrylates and derivates thereof, vinyl acetate copolymers, polyvinyl alcohols, polyvinyl butyrals, polyvinyl acetates, sealable maleic resins, alkyd resins, polyolefins, polyamides and saturated, unsaturated, linear and/or branched copolyesters or multi-component polyurethane primer systems.

35. (New) A composite film according to claim 27 wherein the first and second films of the individual laminated films each have a thickness between 10 μm and 100 μm.

36. (New) A method for manufacturing a halogen-free composite film comprising:

applying a laminating adhesive to a first film of a first laminated film;

thereafter drying the first film in a drying tunnel at temperatures from approximately 80° C to 180° C;

joining a second film at the end of the drying tunnel to the first film to produce said first laminated film;

curing said laminating adhesive of said first laminated film;

providing a functional element between said first laminated film and a second laminated film produced in the same way as said first laminated film; and

laminating said first and second laminating films together.

37. (New) A method according to claim 36 wherein the composite film comprises at least one to N sealable, multi-layered laminated films, wherein N is an integer from 2 to 10.

38. (New) A method according to claim 36 further comprising coating the second film with a thermally activated substance.

39. (New) A method according to claim 36 wherein the first and the second film of the individual laminated films are selected from the group consisting of: liquid crystal polymer, polyphenylene sulfide, polyethylene

terephthalate, polyethylene naphthalate, polyketone, polyetherketone, polyetheretherketone, polyetherketoneketone, polyetheretherketoneketone, polyetherimide, polyether sulfone, polysulfone, cyclo-olefin copolymer, and polyamide films.

40. (New) A method according to claim 36 wherein the laminating adhesive is selected from the group consisting of: acrylates, polyurethanes, polyester polyols, polyester urethanes, epoxides, copolyesters or natural adhesive resins, which are used as single-component or multi-component systems.

41. (New) A method according to claim 36 wherein the laminating adhesive is applied wet and the wet application weight of the laminating adhesive is 2 g/m^2 to 40 g/m^2.

42. (New) A method according to claim 38 wherein the thermally activated substance is selected from the group consisting of: cyclo-olefin copolymers, polyesters, polyurethanes, acrylates and their derivates, vinyl acetate copolymers, polyvinyl alcohols, polyvinyl butyrals, polyvinyl acetates, sealable maleic resins, alkyd resins, polyolefins, polyamides and saturated, unsaturated, linear and/or branched copolyesters or multi-component polyurethane primer systems.

43. (New) A method according to claim 36 wherein the first and second films of the individual laminated films each have a thickness between 10 μm and 100 μm.

44. (New) A method according to claim 36 wherein said functional element is an electrically conductive layer, and comprising vacuum depositing a metal layer between the first and second films or on the finished composite film.

45. (New) A method according to claim 44 wherein the vacuum deposited metal layer is copper or aluminum.

In The Abstract:

On page 23 of the English language translation of the German PCT Application, please amend the abstract to appear as follows:

The invention relates to a halogen-free composite film including at least one to N sealable, multi-layered composite film(s), wherein N is an integer from 2 to 10, and in which a functional layer and/or a functional element is interposed between the individual composite films. In addition, the invention relates to a method for manufacturing the halogen-free composite film and its use as a flexible, multi-purpose material.

REMARKS

Applicants have amended the specification and the claims of the English language translation of the PCT application to put it in proper form for U.S. examination.

Applicants submit two new drawings sheets to replace the PCT application drawing sheets containing the same figures. Terms used in the figures have been translated and the reference numerals have been put in proper U.S. form. No new matter has been added.

With regard to several of the references noted in the International Search Report, Applicants assert that the present claims are novel and non-obvious because the present claims and the prior art differ.

In particular, EP 0 644 560 discloses a tape or sheet comprising a polyester film and a layer of polyolefinic adhesive layer having modulus of bending elasticity in a range of 500 to 20,000 kgf/cm^2. As can be seen from the disclosure (page 3, lines 56, 57), an anchor layer is provided as needed between the film layer and the adhesive layer. The anchor coat layer can comprise a urethane anchor coating agent, a silane-modified polyolefin resin as well as organic titanium compounds. In contrast to the present invention the flat cable of the EP 0 644 560 does not include at least two polymer composites being identical or different from each other being manufactured of at least two identical or different polymer films and an adhesive layer. Nor are different kinds of functional elements provided between the at least two composites. Furthermore, the cable of the cited document is not halogen free (see table 3).

The U.S. 4,548,661 reference relates to a multiconductor flat cable which incorporates an approximately right angle turn in its conductor runs. The exact arrangements are shown in figures 2 and 3 of the description, and are significantly different than the composite film arrangement of the present invention. Figures 2 and 3 of the '661 reference show that the cable 10 in the form of a first lamination comprises basically a first insulation cover sheet 14, a first insulation base sheet 16,

and separate multiple runs 18 of a conductor 20 located between the first cover and base sheets 14, 16. Additionally, each of the cover and base sheets 14, 16 includes an adhesive coating 22 on a surface thereof which is incorporated into the interior of the cable 10. This and every other embodiment shown in the '661 reference is totally different from the present invention, particularly in view of the method of producing the cable of the '661 patent.

The U.S. 3,612,743 reference describes a flat conductor cable wherein the cable 10 comprises multiple ribbon-like conductors. The preferred embodiment is shown in figures 1 and 2. As can be seen in the drawings, the cable 10 includes a plurality of flat conductors 11 of an electrically conductive metal arranged in spaced, edge-to-edge, parallel relationship and separated by adhesive 12 which has insulating qualities. The conductors 11 are encased by top and bottom layers 13 and 14 of insulating material. A layer of shielding metal 15, applied by electroless and electrolytic platings, surrounds the insulation-encased flat conductor layer, the outermost conductors 11a and 11b being in contact with the shielding layer 15 at their outer edges as a result of these edges having been exposed prior to plating. The shielding layer is in turn encased by top and bottom outer layers 16 and 17, of insulating material. The cable disclosed in the '743 patent is substantially different from the present invention and does not teach the technical solution of the present invention.

The EP 0 208 138 reference shows an unusual arrangement for a flat cable. In particular, a flat cable with a plurality of isolated spaced electrical conductors being separated from each other is provided, wherein the flat cable comprises, at least at one side, an insulating layer or an antistatic layer. This is nothing like the composite film or method of the present invention.

Finally, the U.S. 4,075,020 reference discloses a cover layer for flexible circuits which provides increased flexibility. The cover layer encapsulates a flexible circuit having a plurality of spaced conductors on a flexible insulating substrate. The cover layer is a tri-layered laminate having a first layer of insulating film, a second intermediate layer of a thermosetting adhesive and a third layer of a phenolic resin

adhesive. The cover layer is bonded to the flexible circuit with the third layer of phenolic resin adhesive being contiguous the conductors. The reference is directed toward a flexible cover layer for a flat cable. There is no teaching or suggestion of the composite film or method of the present invention.

In view of the foregoing amendments and remarks, Applicants submit that the present claims are allowable over the prior art of record. Further examination of the same is now requested and, if appropriate, allowance of the foregoing claims is earnestly solicited.

Respectfully Submitted,

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Dated: January 23, 2002

VERSION WITH MARKINGS TO SHOWING CHANGES MADE

In The Drawings:

Please substitute the two (2) sheets of drawings submitted herewith, one sheet containing Figures 1, 2A and 2B and the second sheet containing Figure 3, in place of the PCT application drawing sheets containing the same figures.

In The Specification:

On page 1 of the English language translation of the German PCT Application, please amend the first heading of the specification to appear as follows:

Background Of The Invention [Description]

On page 4 of the English language translation of the German PCT Application, please insert the following heading between the second and third paragraphs of the specification and amend the third paragraph to appear as follows:

> Consequently, the object of the invention is to prepare a halogen-free composite film and a process for manufacturing the same, wherein the composite film must satisfy the above-mentioned requirements.
>
> **Summary Of The Invention**
>
> This object is achieved in that the halogen-free composite film in accordance with the invention **[consists of]** **includes** at least one to N sealable, multi-layered laminated films, wherein N is an integer from 2 to 10. A functional layer and/or a functional element is **[present]** **interposed** between the individual laminated films. The individual sealable, multi-layered laminated films are composed of a first and a second film that are bonded

together by means of a laminating adhesive or lacquer. The films in the individual laminated films can be identical to and/or different from one another.

On page 6 of the English language translation of the German PCT Application, please amend the first full paragraph to appear as follows:

The following can be used as thermally activated substances, depending on the later use of the composite film: copolyester systems, cyclo-olefin copolymers, polyurethanes, acrylates and **[derivates]** **derivatives** thereof, vinyl acetate copolymers, polyvinyl alcohols, polyvinyl butyrals, polyvinyl acetates, sealable maleic resins, alkyd resins, polyolefins and polyamides. In addition, saturated, unsaturated, linear and/or branched copolyesters can also be used, such as products from the DYNAPOL line from Degussa. These materials are distinguished by the fact that they are durable yet at the same time are intrinsically flexible, bond well to metals, and have good resistance to chemicals.

On page 7 of the English language translation of the German PCT Application, please insert the following heading between the fifth and sixth paragraphs of the specification, amend the sixth paragraph and add a new seventh and eighth paragraphs to appear as follows:

Moreover, the composite film can be used as a protective film and/or cover film for flexible printed conductors.

Brief Description Of The Drawings

Figure 1 shows the structure of a ribbon cable **[that was]** manufactured **in accordance** with **one embodiment of** the composite film.

Figures 2A and 2B show a laminated film according to the present invention with shielding on the inside and a laminated film with shielding on the outside.

Figure 3 is a schematic diagram of a lacquering and laminating system for producing a composite film in accordance with the present invention.

On page 7 of the English language translation of the German PCT Application, please insert the following heading between the sixth and seventh paragraphs of the specification and amend the seventh paragraph which continues on page 8 to appear as follows:

Figure 1 shows the structure of a ribbon cable that was manufactured with the composite film.

Detailed Description Of The Invention

Referring now to Figure 1, [For] for the manufacture of ribbon cables, two identical or different laminated films A and B are used, which consist of a film 1, a laminating lacquer 2, a film 3 and if applicable a thermally activated substance 4. For the functional layer, a metallic conductor, for example stranded copper wire, is laminated between two strips of the laminated films A and B. The process is performed in such a way that a copper foil is cut into narrow

strips on the laminating machine and laminated between the two laminated film strips by hot laminating rollers at temperatures ranging from 150° C to 400° C, preferably 180° C to 280° C. At the laminating station, the two strips of film with the metallic conductor in the intermediate layer are sealed together through pressure and temperature. As a result of this pressure and temperature treatment, the thermally activated substance or sealing film becomes thermoplastic and bonds to the second strip of film.

On page 12 of the English language translation of the German PCT Application, please amend the second full paragraph which continues on page 13 to appear as follows:

Figure 3 shows a schematic representation of the lacquering and laminating system for producing the laminated film. The film to be laminated is located on roller **[1]** 10, and this film is transported to the applicator unit **[2]** 20, where the laminating adhesive is applied by means of appropriate application technologies, such as smooth roller application, gridded roller application, or brushed application. After application of the laminating adhesive, the coated film is transported to the drying tunnel **[3]** 30. Located at the end of the drying tunnel is a supply roll device with another film **[4]** 40; the two films are bonded together in the laminating station **[5]** 50. Next, this laminated film is reeled by an appropriate device **[6]** 60 and the adhesive is cured. When needed, the incoming film is coated with a thermally activated substance.

In The Claims:

Please cancel claims 1-24.

Please add new claims 25-45 to read as follows:

25. (New) **A halogen-free composite film comprising at least one to N sealable, multi-layered laminated film(s), wherein N is an integer from 2 to 10, and in which a functional element is interposed between the individual laminated films.**

26. (New) **A composite film according to claim 25 wherein the functional element is a printed circuit board, a sensor, a metallic stranded wire, a metallic conductor material, or an electronic component.**

27. (New) **A composite film according to claim 25 wherein the sealable, multi-layered laminated films each comprise a first film, a laminating adhesive or lacquer, and a second film.**

28. (New) **A composite film according to claim 25 wherein each of the sealable, multi-layered laminated films are identical to one another.**

29. (New) **A composite film according to claim 27 wherein the second film of each laminated film comprises a thermally activated substance.**

30. (New) A composite film according to claim 27 wherein the first and the second film of the individual laminated films are selected from the group consisting of: liquid crystal polymer, polyphenylene sulfide, polyethylene terephthalate, polyethylene naphthalate, polyketone, polyetherketone, polyetheretherketone, polyetherketoneketone, polyetheretherketoneketone, polyetherimide, polyether sul-fone, polysulfone, cyclo-olefin copolymer, and polyamide films.

31. (New) A composite film according to claim 27 wherein the laminating adhesive or lacquer is selected from the group consisting of: acrylates, polyurethanes, polyester polyols, polyester urethanes, epoxides, copolyesters or natural adhesive resins, which can be used as single-component or multi-component systems.

32. (New) A composite film according to claim 30 wherein the laminating adhesive or lacquer is selected from the group consisting of: acrylates, polyurethanes, polyester polyols, polyester urethanes, epoxides, copolyesters or natural adhesive resins, which can be used as single-component or multi-component systems.

33. (New) A composite film according to claim 27 wherein the wet application weight of the laminating adhesive is 2 g/m^2 to 40 g/m^2.

34. (New) A composite film according to claim 29 wherein the thermally activated substance is selected from

the group consisting of: cyclo-olefin copolymers, polyesters, polyurethanes, acrylates and derivates thereof, vinyl acetate copolymers, polyvinyl alcohols, polyvinyl butyrals, polyvinyl acetates, sealable maleic resins, alkyd resins, polyolefins, polyamides and saturated, unsaturated, linear and/or branched copolyesters or multi-component polyurethane primer systems.

35. (New) A composite film according to claim 27 wherein the first and second films of the individual laminated films each have a thickness between 10 μm and 100 μm.

36. (New) A method for manufacturing a halogen-free composite film comprising:

applying a laminating adhesive to a first film of a first laminated film;

thereafter drying the first film in a drying tunnel at temperatures from approximately 80° C to 180° C;

joining a second film at the end of the drying tunnel to the first film to produce said first laminated film;

curing said laminating adhesive of said first laminated film;

providing a functional element between said first laminated film and a second laminated film produced in the same way as said first laminated film; and

laminating said first and second laminating films together.

37. (New) A method according to claim 36 wherein the composite film comprises at least one to N sealable, multi-layered laminated films, wherein N is an integer from 2 to 10.

38. (New) A method according to claim 36 further comprising coating the second film with a thermally activated substance.

39. (New) A method according to claim 36 wherein the first and the second film of the individual laminated films are selected from the group consisting of: liquid crystal polymer, polyphenylene sulfide, polyethylene terephthalate, polyethylene naphthalate, polyketone, polyetherketone, polyetheretherketone, polyetherketoneketone, polyetheretherketoneketone, polyetherimide, polyether sulfone, polysulfone, cyclo-olefin copolymer, and polyamide films.

40. (New) A method according to claim 36 wherein the laminating adhesive is selected from the group consisting of: acrylates, polyurethanes, polyester polyols, polyester urethanes, epoxides, copolyesters or natural adhesive resins, which are used as single-component or multi-component systems.

41. (New) A method according to claim 36 wherein the laminating adhesive is applied wet and the wet application weight of the laminating adhesive is 2 g/m^2 to 40 g/m^2.

42. (New) **A method according to claim 38 wherein the thermally activated substance is selected from the group consisting of: cyclo-olefin copolymers, polyesters, polyurethanes, acrylates and their derivates, vinyl acetate copolymers, polyvinyl alcohols, polyvinyl butyrals, polyvinyl acetates, sealable maleic resins, alkyd resins, polyolefins, polyamides and saturated, unsaturated, linear and/or branched copolyesters or multi-component polyurethane primer systems.**

43. (New) **A method according to claim 36 wherein the first and second films of the individual laminated films each have a thickness between 10 µm and 100 µm.**

44. (New) **A method according to claim 36 wherein said functional element is an electrically conductive layer, and comprising vacuum depositing a metal layer between the first and second films or on the finished composite film.**

45. (New) **A method according to claim 44 wherein the vacuum deposited metal layer is copper or aluminum.**

In The Abstract:

On page 23 of the English language translation of the German PCT Application, please amend the abstract to appear as follows:

The invention relates to a halogen-free composite film **[consisting of]** **including** at least one to N sealable, multi-layered **[laminated]** **composite** film(s), wherein N is an integer from 2 to 10, and in which a functional layer and/or a functional element is **[present]** **interposed** between the individual **[laminated]** **composite** films. In addition, the invention relates to a **[process]** **method** for manufacturing the halogen-free composite film and its use as a flexible, multi-purpose material.

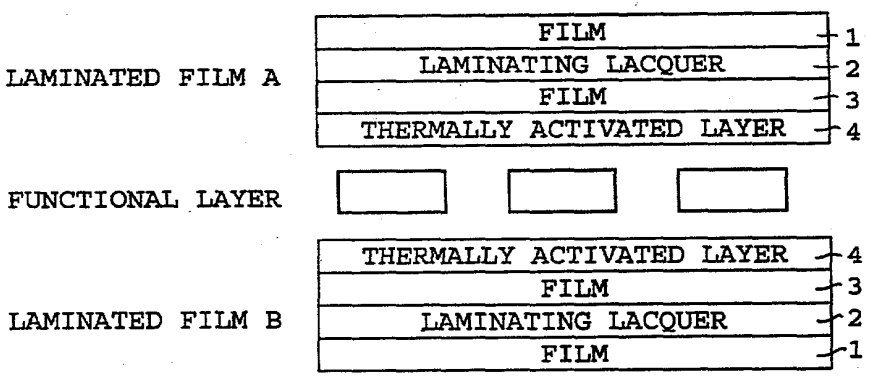

FIG. 1

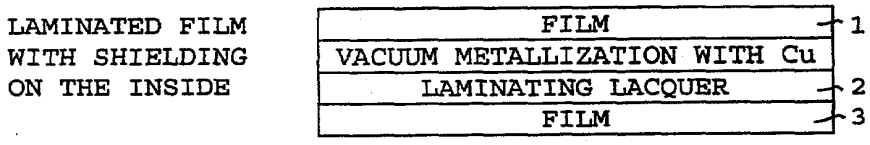

FIG. 2A

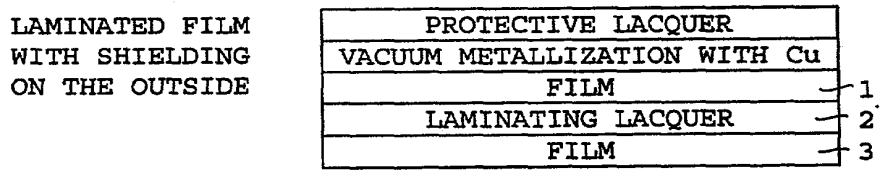

FIG. 2B

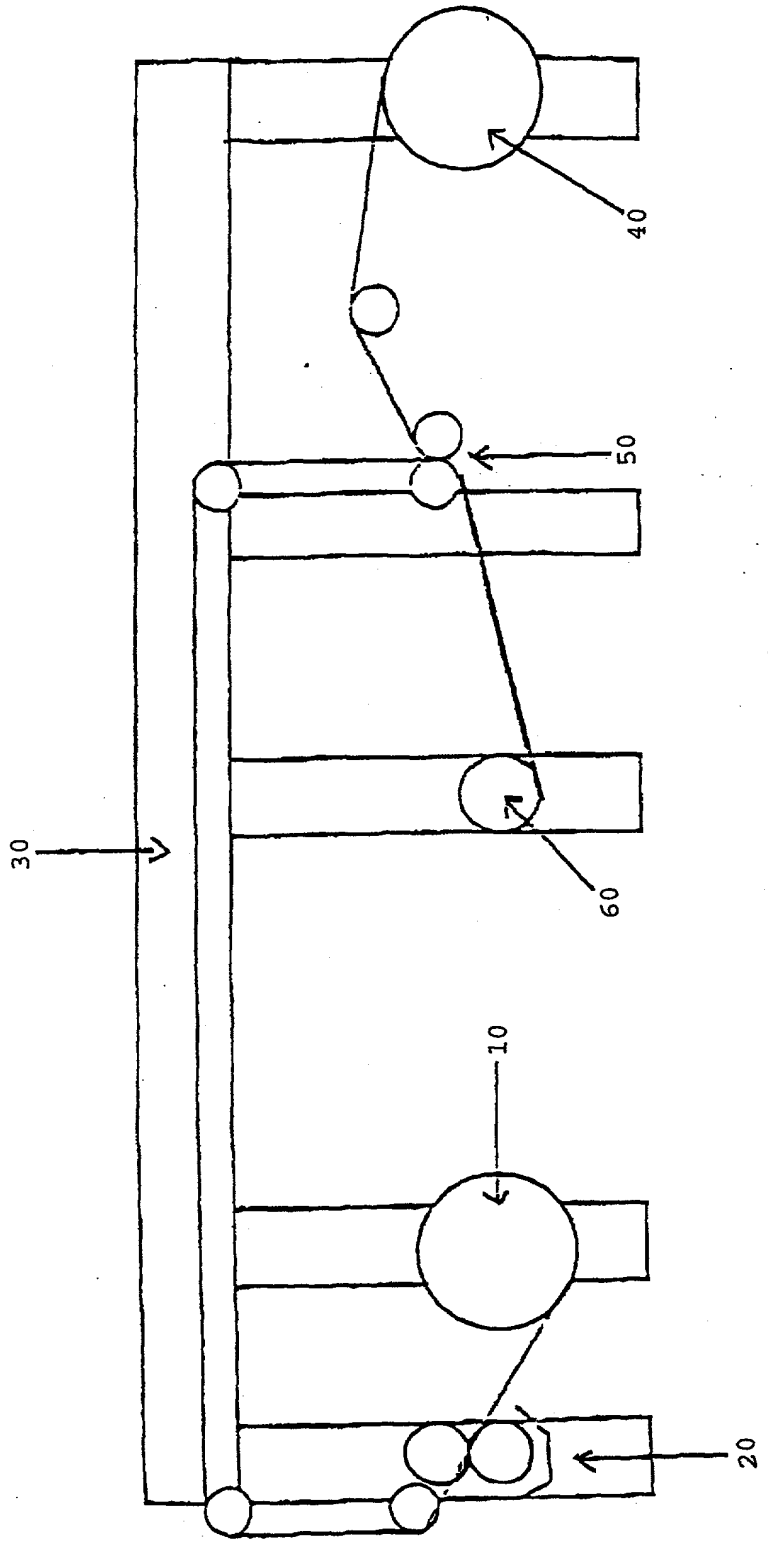

FIG. 3